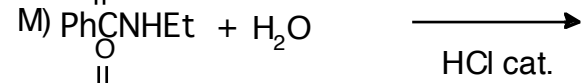
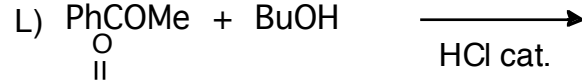
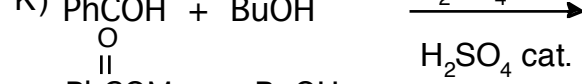
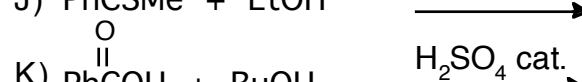
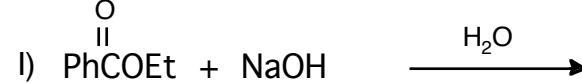
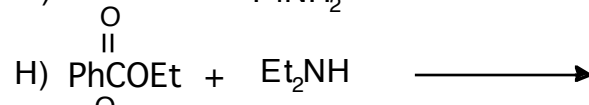
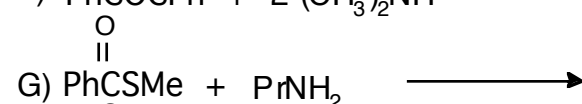
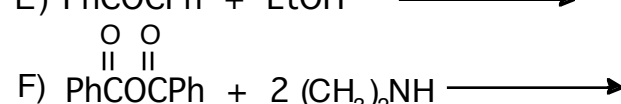
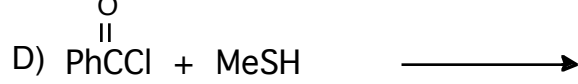
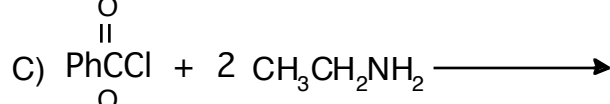
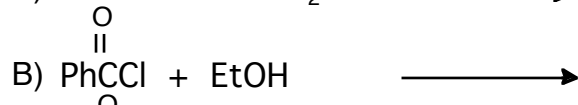
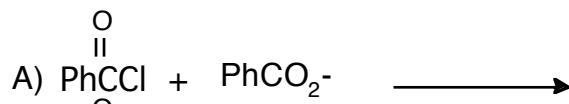


Names: \_\_\_\_\_

Chem 227/ Dr. Rusay

**Carboxylic Acid Derivatives: Nucleophilic Acyl Substitutions**

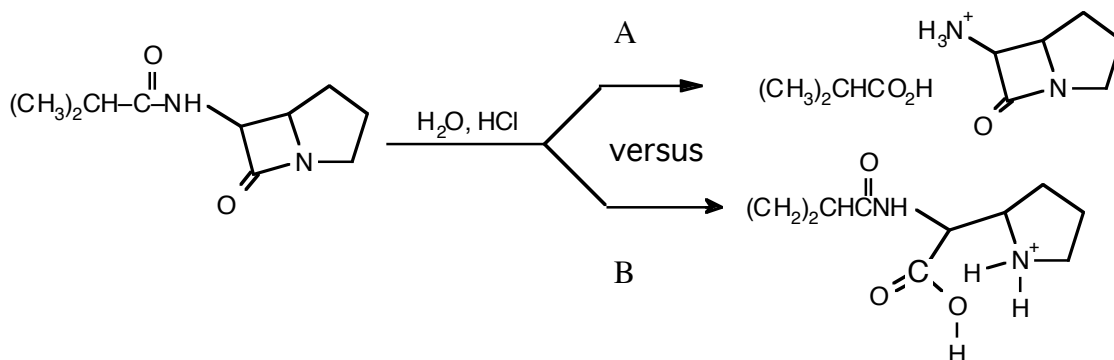
1. Each of the following reactions involves nucleophilic substitution at an acyl carbon (carbonyl of a carboxylic acid or derivative) by way of a tetrahedral addition intermediate. Complete the separate table which follow the reactions indicating the two products that are formed.



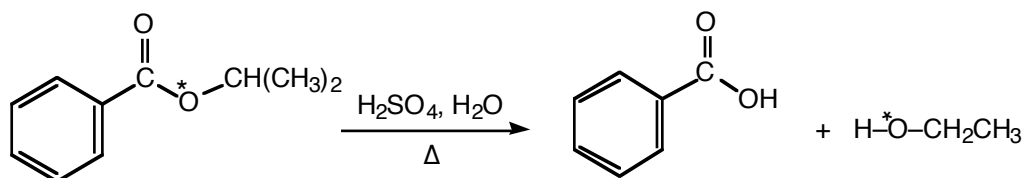


	Product 1	Product 2
A		
B		
C		
D		
E		
F		
G		
H		
I		
J		
K		
L		
M		
N		

2. a. In the following case, predict which of the two competing reactions will be faster? Briefly explain your choice.



3. The ester shown is labeled with oxygen-18 as indicated ( $^*\text{O}=\text{}^{18}\text{O}$ ). Provide a mechanism consistent with the labeling results shown when the ester is hydrolyzed in unlabeled water at  $\text{pH} = 2$ . Use arrows to show electron movement and show all intermediates.

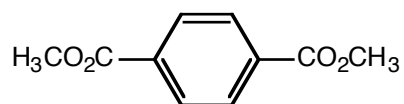


4. Compound **A**,  $C_{12}H_{16}O_2$ , exhibited a strong absorption in the IR spectrum at  $1715\text{ cm}^{-1}$ . Treatment of **A** with  $NaOH/H_2O$  gave a neutral compound **B** and a sodium salt that after acidification gave compound **C**. **B** exhibited strong broad absorption in the IR spectrum at  $3333\text{ cm}^{-1}$  and could be oxidized with aqueous chromic acid ( $Na_2Cr_2O_7/H_2SO_4/H_2O$ ) to 2-methylbutanoic acid. **C** exhibited absorption in the IR spectrum at  $1681\text{ cm}^{-1}$  and a very broad band over the range  $2500\text{--}3500\text{ cm}^{-1}$ . The  $^1H$  NMR spectrum of **C** exhibited absorption at  $\delta$  7.1–8.5 (m, 5H) and 12.70 (s 1H). Provide structures for **A**, **B**, and **C**.

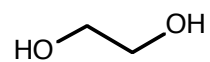
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5. BOC, Benzyloxycarbonylchloroformate ( $BO_2C-Cl$ ),  $PhCH_2O\overset{\overset{O}{\parallel}}{C}Cl$ , is a very important and widely used reagent applied to the synthesis of peptides and proteins as a protective group for the amino groups of amino acids.
- Show how  $BO_2C-Cl$  could be synthesized from phosgene.
  - Give the structure of the product from the reaction of  $BO_2C-Cl$  with the amino acid glycine,  $H_2NCH_2CO_2H$ .

6. Dacron is a polyester formed by transesterification of dimethyl terephthalate with ethylene glycol to give a long-chain polymer molecule. Provide a partial structure of Dacron that shows two of the repeating units of the polymer (Use 2 molecules of each of the monomers below



dimethyl terephthalate



ethylene glycol